



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,814	10/13/2000	Seung-pil Chung	SEC.760	7239

7590 06/25/2003
JONES VOLENTINE, L.L.C.
Suite 150
12200 Sunrise Valley Drive
Reston, VA 20191

EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 06/25/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/689,814

Applicant(s)

CHUNG ET AL.

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-11, 38-41 and 43-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-11, 38-41 and 43-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/20/03 has been entered.

Claim Objections

Claim 48 is objected to because of the following informalities: claim 48 fails to end in a period. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7, 11, 38, 41, 44, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Shinriki et al., U.S. Patent 6,143,081.

Moore et al. shows the invention substantially as claimed including a semiconductor manufacturing apparatus comprising: a vertically movable susceptor 212 installed at a lower portion of a processing chamber 209, for receiving a wafer thereon; means for annealing the wafer using a radiant heat source 204; and a gas diffuser 207 installed below the wafer annealing means and within the processing chamber and adapted to supply reaction gases into the process chamber (see fig. 2A and its description).

Moore et al. fails to expressly disclose the means for annealing the wafer being in the upper portion of the processing chamber. Shinriki et al. discloses a heater 280 comprising a lamp and installed at an upper portion of the processing chamber; and a gas diffuser 244 installed below the heater, for supplying reaction gases into the processing chamber (see Fig. 13 and col. 19-lines 11-57). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore et al. so as to include the radiant heat source at

the upper portion of the processing chamber because Shinriki et al. shows this as a suitable position in which to locate a radiant heat source. Furthermore, rearrangement of parts has been held to have been obvious (see *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)).

Claims 7, 11, 38, 41, 44, and 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Iida et al., U.S. Patent 5,527,417.

Moore et al. shows the invention substantially as claimed including a semiconductor manufacturing apparatus comprising: a vertically movable susceptor 212 installed at a lower portion of a processing chamber 209, for receiving a wafer thereon; means for annealing the wafer using a radiant heat source 204; and a gas diffuser 207 installed below the wafer annealing means and within the processing chamber and adapted to supply reaction gases into the process chamber (see fig. 2A and its description).

Moore et al. fails to expressly disclose the means for annealing the wafer being in the upper portion of the processing chamber. Iida et al. discloses a heater 102 comprising a lamp and installed at an upper portion of the processing chamber; and a gas diffuser 112 installed below the heater, for supplying reaction gases into the processing chamber (see Fig. 3 and col. 9-lines 3-51). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore et al. so as to include the radiant heat source at

the upper portion of the processing chamber because lida et al. shows this as a suitable position in which to locate a radiant heat source. Furthermore, rearrangement of parts has been held to have been obvious (see *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)).

Claims 8, 43, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Shinriki et al., U.S. Patent 6,143,081 as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Yin et al., U.S. Patent 6,189,484.

Moore et al. and Shinriki et al. are applied as above but fail to expressly disclose a cooling line contained within the susceptor. Yin et al. discloses an apparatus with a heating element 170 in the upper portion of the processing chamber whereby the susceptor 137 can also contain a cooling line therein (see col. 6-lines 9-11). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore et al. modified by Shinriki et al. so as to include the cooling line of Yin et al. because this allows for better temperature control of the wafer.

Claims 8, 43, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of lida et al., U.S. Patent 5,527,417 as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Yin et al., U.S. Patent 6,189,484.

Moore et al. and Iida et al. are applied as above but fail to expressly disclose a cooling line contained within the susceptor. Yin et al. discloses an apparatus with a heating element 170 in the upper portion of the processing chamber whereby the susceptor 137 can also contain a cooling line therein (see col. 6-lines 9-11). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore et al. modified by Iida et al. so as to include the cooling line of Yin et al. because this allows for better temperature control of the wafer.

Claims 9-10 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Iida et al., U.S. Patent 5,527,417 as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Shang et al., U.S. Patent 6,182,603.

Moore et al. and Iida et al. are applied as above but fail to expressly disclose a gas supply line for receiving the reaction gases supplied via pipes installed outside the processing chamber, the first pipe having a microwave guide for changing a gas mixture containing a hydrogen gas and a fluorine-containing gas in a predetermined ratio, or the hydrogen gas only, into a plasma state, and a second pipe for supplying the fluorine-containing gas into the processing chamber. Shang et al. discloses a first pipe containing a sapphire tube 77 which is coupled to a microwave guide 68 for exciting a gas into a plasma and a second pipe 53 for supplying gas to the processing chamber (see Fig. 1 and col. 4-line 15 to col. 5-line 46). In view of this disclosure, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of lida et al. modified by Yin et al., so as to include the pipe structure of Shang et al. because this will result in the capability of cleaning the apparatus without causing the damage that sometimes occurs when generating plasma in the processing chamber (see col. 2-lines 36-62 of Shang et al.).

With respect to the particular gas being transported through the pipes, such limitation is directed to a method limitation instead of an apparatus limitation, and since an apparatus is being claimed the method limitations are not given patentable weight. The method limitations are considered an intended use which does not patentably distinguish an apparatus claim. The apparatus of lida et al. modified by Yin et al. and further modified by Shang et al. is capable of supplying the specific claimed gases, through the pipes, to the apparatus.

With respect to the porous plate of claims 9 and 49, the lida et al. reference shows a porous plate forming the bottom of the diffuser, for evenly distributing the reaction gases into the processing chamber, wherein the diffuser is in flow contact with the gas supply line (see fig. 3). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore so as to include the porous plate suggested by lida et al. in order to provide more uniform gas distribution across the wafer.

Claims 9-10 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Shinriki et al., U.S. Patent 6,143,081

as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Shang et al., U.S. Patent 6,182,603.

Moore et al. and Shinriki et al. are applied as above but fail to expressly disclose a gas supply line for receiving the reaction gases supplied via pipes installed outside the processing chamber, the first pipe having a microwave guide for changing a gas mixture containing a hydrogen gas and a fluorine-containing gas in a predetermined ratio, or the hydrogen gas only, into a plasma state, and a second pipe for supplying the fluorine-containing gas into the processing chamber. Shang et al. discloses a first pipe containing a sapphire tube 77 which is coupled to a microwave guide 68 for exciting a gas into a plasma and a second pipe 53 for supplying gas to the processing chamber (see Fig. 1 and col. 4-line 15 to col. 5-line 46). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore et al. modified by Shinriki et al., so as to include the pipe structure of Shang et al. because this will result in the capability of cleaning the apparatus without causing the damage that sometimes occurs when generating plasma in the processing chamber (see col. 2-lines 36-62 of Shang et al.).

With respect to the particular gas being transported through the pipes, such limitation is directed to a method limitation instead of an apparatus limitation, and since an apparatus is being claimed the method limitations are not given patentable weight. The method limitations are considered an intended use which does not patentably distinguish an apparatus claim. The apparatus of Moore et al. modified by Shinriki et al.

and further modified by Shang et al. is capable of supplying the specific claimed gases, through the pipes, to the apparatus.

With respect to the porous plate of claim 9, the Shinriki et al. reference shows a porous plate forming the bottom of the diffuser, for evenly distributing the reaction gases into the processing chamber, wherein the diffuser is in flow contact with the gas supply line (see fig. 13). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Moore so as to include the porous plate suggested by Shinriki et al. in order to provide more uniform gas distribution across the wafer.

Claims 39-40 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Iida et al., U.S. Patent 5,527,417 as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Collison et al., U.S. Patent 6,203,657.

Moore et al. and Iida et al. are applied as above but fail to expressly disclose wherein the gas diffuser is connected to two separate pipes extending outside of said processing chamber, one of the two pipes being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes being adapted to supply to the gas diffuser a second gas that is in a non-plasma state. Collison et al. discloses a gas diffuser 124 connected to two separate pipes extending outside of said processing chamber, one of the two pipes 108 being adapted to supply to the gas

diffuser a first gas excited to a plasma state and another of the two pipes 222 being adapted to supply to the gas diffuser a second gas that is in a non-plasma state (see figs. 2B and 3 and col. a state (see figs. 2B and 3 and col. 7-line 12 to col. 8-line 26). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Moore et al. apparatus modified by Iida et al. so as to include the gas diffuser structure of Collison et al. because such an apparatus would allow more flexibility as to the processes being conducted within the apparatus, and can provide for a longer life of the apparatus.

Claims 39-40 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al., U.S. Patent 5,444,217 in view of Shinriki et al., U.S. Patent 6,143,081 as applied to claims 7, 11, 38, 41, 44, and 47 above, and further in view of Collison et al., U.S. Patent 6,203,657.

Moore et al. and Shinriki et al. are applied as above but fail to expressly disclose wherein the gas diffuser is connected to two separate pipes extending outside of said processing chamber, one of the two pipes being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes being adapted to supply to the gas diffuser a second gas that is in a non-plasma state. Collison et al. discloses a gas diffuser 124 connected to two separate pipes extending outside of said processing chamber, one of the two pipes 108 being adapted to supply to the gas diffuser a first gas excited to a plasma state and another of the two pipes 222 being adapted to supply to the gas diffuser a second gas that is in a non-plasma state (see

figs. 2B and 3 and col. a state (see figs. 2B and 3 and col. 7-line 12 to col. 8-line 26). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Moore et al. apparatus modified by Shinriki et al. so as to include the gas diffuser structure of Collison et al. because such an apparatus would allow more flexibility as to the processes being conducted within the apparatus, and can provide for a longer life of the apparatus.

Response to Arguments

Applicant's arguments with respect to claims 7-11, 38-41, and 43-49 have been considered but are moot in view of the new ground(s) of rejection.

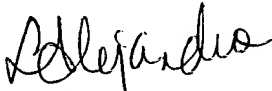
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Art Unit: 1763

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Luz L. Alejandro
Primary Examiner
Art Unit 1763

June 21, 2003
